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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/594,655	06/27/2007	John Thomas Sirr Irvine	MC1-8354	1659

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Christopher P. Harris
Tarolli, Sundheim, Covell & Tummino
1300 East Ninth Street
Suite 1700
Cleveland, OH 44114

EXAMINER	
BELL, BRUCE F	

ART UNIT	PAPER NUMBER
1795	

MAIL DATE	DELIVERY MODE
04/21/2010	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/594,655	IRVINE ET AL.	
	Examiner	Art Unit	
	Bruce F. Bell	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *18-35* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☐ Claim(s) *18-29 and 32-35* is/are rejected.

7)☒ Claim(s) *30 and 31* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *26 September 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *9/26/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

The following guidelines illustrate the preferred layout for the specification of a utility application. These guidelines are suggested for the applicant's use.

Arrangement of the Specification

As provided in 37 CFR 1.77(b), the specification of a utility application should include the following sections in order. Each of the lettered items should appear in upper case, without underlining or bold type, as a section heading. If no text follows the section heading, the phrase "Not Applicable" should follow the section heading:

(a) TITLE OF THE INVENTION.
(b) CROSS-REFERENCE TO RELATED APPLICATIONS.
(c) BACKGROUND OF THE INVENTION.
    (1) Field of the Invention.
    (2) Description of Related Art including information disclosed under 37 CFR 1.97 and 1.98.
(d) BRIEF SUMMARY OF THE INVENTION.
(e) BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S).
(f) DETAILED DESCRIPTION OF THE INVENTION.
(g) CLAIM OR CLAIMS (commencing on a separate sheet).
(h) ABSTRACT OF THE DISCLOSURE (commencing on a separate sheet).

Applicant is requested to place the appropriate section headings prior to each section of the specification.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 24 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 24 is vague and indefinite with respect to the phrase "and such phases". It is unclear as to what these phases are from the instant claim as presented.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 18-21, 23, 24 are rejected under 35 U.S.C. 102(b) as being anticipated by Iwahara (Solid States Ionics Vol.77, April 1995 pages 289-298).

Iwahara disclose proton conducting ceramics of $SrCeO_3$, $BaCeO_3$, $CaZrO_3$, $SrZrO_3$, $SrCe_{0.95}Yb_{0.05}O_{3-\delta}$, $BaCe_{0.9}Nd_{0.1}O_{3-\delta}$ and $CaZr_{0.9}In_{0.1}O_{3-\delta}$. See page 289, col. 2, second paragraph. The $BaCeO_3$ proton conductor is shown to have the highest conductivity. See page 290, col. 1, no. 2, second paragraph. The proton conductors above are shown to be used in steam electrolysis for hydrogen production. See page 295 and 295, no. 3.5.

Iwahara anticipates the applicants instant claims as shown by way of the disclosure to Iwahara above. Figure 12 of the document shows the electrical connection of the power source as set forth in the instant claims and shows that the hydrogen is transported across the proton conducting membrane and that hydrogen and unreacted water are removed from the anode side of the membrane. The substrate is considered to be that of the electrode since applicants instant claims as presented do not state that the anode and substrate are separate and in fact within applicants instant specification, it is shown that the electrode and substrate may be one piece or be separate.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 22, 24-28, 32-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iwahara in combination with Valkenberg et al Solid State Ionics 97 (1997)511-515, EP 0472922, Schneller (Solid State Ionics Vol. 164 (2003) pages 131-136) and Jacobson et al (2002/0081762).

Iwahara is as disclosed above in the 35 USC 102(b) rejection.

Iwahara does not disclose the $Ba_3Ca_{1.18}Nb_{1.82}O_{3-\delta}$, membrane material, support pore size or porosity, sintering, membrane thickness integral versus separate support/electrode.

Valkenberg discloses a proton conducting membrane of $Ba_3Ca_{1.18}Nb_{1.82}\ O_{3-\delta}$ that is used in steam electrolysis.

EP 0472922 disclose a reversible fuel cell which comprises a sintered substrate of titanium niobium and a cation exchange membrane coated on both sides with an electrocatalyst.

Schneller et al disclose $BaZrO_3$ based proton conductive materials that are dense and that may be doped.

Jacobson et al disclose a trilayer structure of an electrode/electrolyte/electrode that is simultaneously sintered. See abstract. A Ni-YSZ substrate is disclosed as the

support for the device that is low cost, mechanically strong and is porous. The substrate may be coated with a high electrocatalytic material and the electrode/electrolyte/electrode is bonded or affixed to the substrate. See paragraph 0014 and 0016. The three layer structure shown discloses that the electrolyte is preferably between 5 to 20 microns thick. See paragraph 0015. The electrodes can be made of a cermet or a mixed ionic electronic conductor. See paragraph 0027-0028. The YSZ-NiO and YSZ –LSM electrodes are known to improve performance. The solid electrolyte material is known to be used for either oxygen or hydrogen ion separation. See paragraph 0032. If the electrolyte is a proton conducting thin film of doped $BaCeO_3$, $SrCeO_3$ or $SrZrO_3$, in stead of an oxygen ion conductor, the device can be used to separate hydrogen from a feed gas containing hydrogen. See paragraph 0046 and 0050. Electrode structures having a porous layer of electrolyte particles on a dense electrolyte membrane with electrocatalyst material on and within the porous layer of electrolyte are known. See paragraph 0053. Sintering is performed on the structure so that it facilitates the performance of the resulting device. See paragraph 0056. Suitable electrode materials are disclosed in paragraph 0059. Suitable electrolyte materials are disclosed in paragraph 0063. Both pores and particles in the electrodes are greater than about 0.5 microns and less than about 20 microns in diameter. See paragraph 0028. The electrode porosity is shown to be about 30 to 40% porous in order to allow gases to diffuse through the electrode. See paragraph 0066. The patent further shows that the a porous electrode on a substrate See paragraph 0071.

The subject matter as a whole would have been obvious to one of ordinary skill in the art at the time the instant invention was made because even though the prior art of Iwahara does not teach the attributes listed in the dependent claims as set forth above, the prior arts of Valkenberg et al Solid State Ionics 97 (1997)511-515, EP 0472922, Schneller (Solid State Ionics Vol. 164 (2003) pages 131-136) and Jacobson et al (2002/0081762), do show that these concepts are conventional in the art and that they are used in conjunction with steam electrolysis and/or hydrogen production. In most of the references, the prior art teaches that dependent upon the membrane used, hydrogen and/or oxygen can be produced and further that if a fuel cell is disclosed, that running the fuel cell in reverse will form the electrolytic cell where hydrogen can be produced. Sintering aids for use with ceramic perovskite materials are known to those having ordinary skill in the art. Therefore, the prior art as set forth above renders the applicants instant invention as obvious for the reasons set forth above.

Allowable Subject Matter

7. Claims 30, 31 are allowable over the prior art of record.

8. Claims 30, 31 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

9. The following is a statement of reasons for the indication of allowable subject matter: The prior art of record fails to teach and/or suggest the membrane of the composition as set forth in the dependent claims.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bruce F. Bell whose telephone number is 571-272-1296. The examiner can normally be reached on Monday-Friday 6:30 AM - 3:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

BFB
April 20, 2010

/Bruce F. Bell/
Primary Examiner, Art Unit 1795